

STEM Mechanics (Catapult, Mouse Trap Racer, Bridge Building etc)

Site: StemAcademy: Projects & Resources - Maker Space - Coding & Robotics

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Book: STEM Mechanics (Catapult, Mouse Trap Racer, Bridge Building etc)

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Table of contents

1. Introduction Mechanics Kits
2. Bridge Engineering Design
3. Catapult
4. Mouse Trap Racer

1. Introduction Mechanics Kits

Please use the menus in the Table of Contents on the LHS of this page to find your kit investigation support resources.

2. Bridge Engineering Design

This **Bridge Engineering Design Classroom ready STEM educational kit** is appropriate for Upper Primary and Secondary School to conduct hands on problem based learning by designing, building, testing, evaluating and redesigning their own truss bridges. The below video highlights the many benefits for educators and learners alike. The Bridge Kit Contents has three separate construction systems for quick bridge construction and analysis including vinyl templates etc.

The Bridge Building Kit Overview has instructions and exemplars and its a great place to get started. We have also provided the Excel data files to supplement the Scientific Investigation exemplars. Bridge Kit Student Worksheets are also available.

This Bridge Kit includes:

- 24 X 3D Printed Drinking Straw Truss Joints
- 24 X 3D Printed Paddle Pop Stick Truss Joints
- Truss Templates; Cambelback, Warren, Parket, Arch, Waddel A, Pratt, Pratt (4/8/12 Joints)
- 200 box of plastic drinking straws
- 200 box of paddle pop sticks
- box of 20, 4 Gauge, 1/2 Inch Self Tappers
- 4 X Phillips Screwdrivers
- 1 X Side Cutter
- 2 X Tasmanian Oak X 40cm Lengths
- 20mm x 12mm
- 12mm x 12mm
- 9mm x 9mm
- 6mm x 6mm

3. Catapult

This **Catapult Classroom STEM educational kit** is appropriate for Upper Primary and Secondary School. This kit includes:

- 4 Complete Catapults
- Tough Vinyl Target Mat
- 4 Seperate Investigations
- Quick Configuration between Experiments
- Exemplars, Instructions and Student Worksheets

The Curriculum relevance is primarily Motion and Mechanics as well as Working Scientifically. These student investigations are also relevant to the Technology and Mathematics Curricula. Full exemplars, worksheets and online support materials are provided for the following investigations:

- Effect of Launch Angle on Projectile Displacement
- Effect of Launch Power on Projectile Displacement
- Effect of Throw Arm Length on Projectile Displacement
- Optimal Catapult Configuration for Desired Projectile Displacement and Accuracy (Vinyl Target Mat Included)

Our Catapult Kit provides hands problem based learning for Upper Primary to Middle School learners on the Physics and catapults through Scientific Investigations. The video below shows the benefits of our kit for both educators and learners. If you have bought the self assembly kit then you will need the Catapult Kit Construction Guide.

The Catapult Kit Overview explains how to get started and has full exemplar scientific investigations - its a classroom teaching aid ready for class data projector presentation (power point presentation in pdf format). Additionally we have provided the Excel data and graphs for all the investigations to scaffold the learning experience and aid teachers. Student worksheets for the Catapult Kit Investigations are kept to a single A4 sheet to aid copying.

If you have bought our Catapult Kit and require further support or are considering purchase and would like more information then please contact us.

4. Mouse Trap Racer

This **Mouse Trap Racer Classroom STEM educational kit** is appropriate for Upper Primary and Secondary School. This kit includes:

- 9 Complete Mousetrap Racers
- 12 Various Length Dowel Spring Arms
- 7 Seperate Scientific Investigations
- Minimal Setup Time between Experiments
- Full Exemplars, Instructions and Student Worksheets including excel data files and graphs

The Curriculum relevance is primarily Mechanics (study of Forces) and Working Scientifically. These student investigations are also relevant to the Technology and Mathematics Curricula. Full exemplars, worksheets and online support materials are provided for the following investigations:

- Effect of Spring Arm Length on Displacement
- Effect of Wheel Diameter on Displacement
- Optimal Vehicle Mechanical Advantage (Pooled Data)
- Effect of Wheel Friction on Displacement
- Influence of Vehicle Mass on Displacement
- Influence of Chassis Design on Displacement

Our Mousetrap Racer Kit provides hands on problem based learning for Upper Primary to Middle School learners on the Physics of Mousetrap Racers through Scientific Investigations. The video above shows the benefits of our kit for both educators and learners. If you have bought the self assembly kit then you will need the Mousetrap Racer Kit Construction Guide.

The Mousetrap Racer Kit Overview explains how to get started and has one exemplar Scientific Investigation - it's a classroom teaching aid ready for class data projector presentation (powerpoint presentation in pdf format). The full set of Scientific Investigation Exemplars combine with the provided Excel data and graphs and Mousetrap Racer Calculations to scaffold the learning experience and aid teachers. Mousetrap Racer student worksheets for Investigations are kept to a single A4 sheet to aid copying. Conventional Mousetrap Racer Experiments or Text Book experiment are easily modified to work with our kit.

An introductory experiment: record and graph displacement and time and then calculate average velocity for each mousetrap racer. Students could evaluate which racer has the greatest displacement and highest average velocity and relate that to racer design.

If you have bought our Mousetrap Kit and require further support or are considering purchasing and would like more information then please contact us.